

USGS-NPS VEGETATION MAPPING PROGRAM

Classification of the Vegetation of Congaree Swamp National Monument

The Nature Conservancy
Southern Conservation Science
101 Conner Drive, Suite 302
Chapel Hill, NC 27514

The Nature Conservancy
International Headquarters
1815 North Lynn Street
Arlington, VA 22209

Table of Contents

Section	Page
1. VEGETATION SAMPLING AND CLASSIFICATION	1
Introduction.....	1
Methods	1
Results.....	2
Conclusion	3
References Cited	4
Contributors	5
2. CLASSIFICATION OF THE CONGAREE SWAMP NATIONAL MONUMENT	6
3. FIELD KEY TO THE PLANT COMMUNITIES OF CONGAREE SWAMP NATIONAL MONUMENT	9
Key 1 – Communities of Upland Flats and Slopes or Upland Depressional Swamps	9
Key 2 – Communities of Seepage Slopes and Levees	9
Key 3 – Communities of Sloughs, Alluvial Flats, and Terraces.....	10
4. VEGETATION DESCRIPTIONS FOR CONGAREE SWAMP NATIONAL MONUMENT	12
<i>Fagus grandifolia</i> - <i>Quercus nigra</i> Forest.....	12
<i>Liquidambar styraciflua</i> - <i>Quercus (nigra, phellos)</i> - <i>Pinus taeda</i> / <i>Vaccinium elliottii</i> - <i>myrica cerifera</i> Forest	14
<i>Acer saccharinum</i> / <i>Leersia lenticularis</i> - <i>Commelina virginica</i> Forest	16
<i>Celtis laevigata</i> - <i>Fraxinus pennsylvanica</i> - <i>Acer negundo</i> - (<i>Juglans nigra</i>) / <i>Asimina triloba</i> / <i>Carex grayi</i> Forest	18
<i>Celtis laevigata</i> - <i>Liquidambar styraciflua</i> - <i>Quercus laurifolia</i> / <i>Carpinus caroliniana</i> / <i>Arundinaria gigantea</i> / <i>Carex lupulina</i> Forest.....	20

Section	Page
<i>Plantanus occidentalis</i> - <i>Celtis laevigata</i> - <i>Fraxinum pennsylvanica</i> / <i>Lindera benzoin</i> - <i>Ilex deciduas</i> / <i>Carex retroflexa</i> Forest.....	23
<i>Populus deltoids</i> / <i>Acer negundo</i> / <i>Boehmeria cylindrical</i> Forest.....	25
<i>Liquidambar styraciflua</i> - <i>Quercus nigra</i> - <i>Quercus laurifolia</i> / <i>Arundinaria gigantean</i> / <i>Carex abscondita</i> Forest.....	27
<i>Salix nigra</i> - <i>Fraxinus pennsylvanica</i> Forest.....	29
<i>Fraxinus pennsylvanica</i> / <i>Leersia lenticularis</i> - <i>Carex lupulina</i> Forest.....	31
<i>Planera aquatica</i> Forest.....	33
<i>Quercus lyrata</i> - <i>Quercus laurifolia</i> / (<i>Arundinaria gigantean</i>) Forest.....	35
<i>Quercus phellos</i> / <i>Carex (intumescens, jorii)</i> / <i>Sphagnum lescurii</i> Forest.....	37
<i>Taxodium distichum</i> - <i>Fraxinus pennsylvanica</i> - <i>Quercus laurifolia</i> / <i>Acer rubrum</i> / <i>Saururus cernuus</i> Forest.....	39
<i>Taxodium distichum</i> - <i>Nyssa aquatica</i> / <i>Fraxinus caroliniana</i> Forest.....	41
<i>Taxodium distichum</i> - <i>Nyssa aquatica</i> - <i>Nyssa biflora</i> / <i>Fraxinus caroliniana</i> / <i>Itea virginica</i> Forest.....	43
<i>Liquidambar styraciflua</i> - <i>Quercus laurifolia</i> / <i>Magnolia virginiana</i> / <i>Carex folliculata</i> Forest.....	45
<i>Nyssa biflora</i> - (<i>Acer rubrum</i>) / <i>Ilex opaca</i> / <i>Leucothoe axillaries</i> / <i>Carex atlantica</i> ssp. <i>Capillacea</i> Forest.....	47
<i>Quercus michauxii</i> / <i>Carpinus caroliniana</i> - <i>Ilex opaca</i> / <i>Leucothoe racemosa</i> Forest.....	49
Successional Pine - Mixed Hardwood Upland Forest.....	51
<i>Pinus palustris</i> - <i>Pinus taeda</i> / <i>Schizachyrium scoparium</i> Woodland.....	53
<i>Vitis rotundifolia</i> - <i>Ampelopsis arborea</i> - <i>Campsis radicans</i> Vine-Shrubland.....	55

5. APPENDICES	57
Appendix A: Glossary of Terms for Vegetation Descriptions	57
Appendix B: Example Field Data Sheets for Congaree Swamp National Monument	60
Appendix C: Plot Assignments to Vegetation Types Referenced by Database Code	65

1. VEGETATION SAMPLING AND CLASSIFICATION

Introduction

This report presents the results of the vegetation classification portion of the USGS-NPS BRD Vegetation Mapping Program at Congaree Swamp National Monument. The major goal of this portion of the project was to classify and describe all plant communities found within the study area. In addition, vegetation data were used by the photointerpreter to determine relationships between signatures on aerial photos and vegetation types on the ground.

Sampling strategy and field methods are described for vegetation sampling. The vegetation classification, field key to the vegetation types, and descriptions of each type are also included.

Methods

The methods used for the sampling and analysis of vegetation data and the development of the classification generally followed the standards outlined in the Field Methods for Vegetation Mapping document produced for this project. This process began with the development of a provisional list of twenty-five vegetation types from the International Classification of Ecological Communities (ICEC; see Weakley *et al.* 1998) that were thought to have a high likelihood of being in the park based on an initial field visit on 13 - 14 June, 1996.

One hundred twenty-eight plots were sampled by two two-person field teams in July, August, and September of 1996. In a deviation from the methodology outlined in the Field Methods document, initial sample points were selected in order to have plots in each of the aerial photograph signature types. The gradsect approach was rejected because there appeared to be no potential for stratifying sampling of the park based on slope, aspect, elevation, soil or other natural features due to a lack of available information. Furthermore, because of isolation from roads and trails of many portions of the park, it was deemed not feasible to use a transect to establish plot locations. After sampling, plots were tentatively assigned to the ICEC at the alliance level and our goal was to have at least five plots in each of the twenty-five provisional vegetation types. Time limitations precluded the ability of the field teams to install ten plots in each of the expected vegetation types as recommended in the Field Methods document.

During field reconnaissance in mid-July 1996, it appeared that there could be a geographic segregation, possibly by drainage, within the Monument of the vegetation types at the NVCS association level so the methodology for establishing plots was modified. In an effort to ensure that the full range of vegetation was sampled, we stratified the Monument into six zones by drainages and made sure that each signature or vegetation type was sampled at least once in each zone in which it occurred. Plots were subjectively placed using two criteria: first, that the plot be as near the middle of the delineated polygon as feasible; and second, and more importantly, that the plot be located within a homogeneous, representative portion of the polygon. Where a complete 20x50 meter plot would not fit within the representative area, a smaller plot size was used. Number of plots and plot size varied by community and by number of aerial photograph

signatures assigned to a vegetation type. Generally, more widespread communities had more plots than rarer ones, and types represented by more than one photo signature had more plots than those with a monotypic signature.

The final vegetation classification and descriptions were produced using the plot data. (A copy of a completed datasheet is attached in Appendix B) The data were analyzed using an ordination technique, Detrended Correspondence Analysis (DCA), and a clustering algorithm, Unweighted Pair-Group Method Using Arithmetic Means (UPGMA). These clusters were used to derive the final classification units. Field experience and judgment were used while reviewing the fit of each plot within the cluster to which it was assigned. As a result, some plots were placed in clusters other than those to which they were initially assigned based on the quantitative data analyses.

Results

The classification of the vegetation at Congaree Swamp National Monument resulted in twenty-two types being defined including twenty forests, one woodland, and one shrubland. Of the total types, twelve are newly described plant associations based on data from the field work, and one is a broadly defined upland successional forest. The percentage of new associations is not surprising given the lack of quantitative field data previously collected in the Congaree Swamp National Monument specifically and in southeastern floodplain forests in general. Detailed descriptions of the new types may be found in following sections.

In classifying vegetation, we attempt to recognize distinctive assemblages of plant species that occur repeatedly in appropriate habitat conditions. These plant communities become the basic mapping units in preparing vegetation maps. The vegetation types described in this report do not always correspond to units on the final vegetation map. Three plant communities distinguishable on the ground could not be distinguished on aerial photographs because the occurrences used to describe the type either were too small to discern from surrounding vegetation types, or were too small to use for training. These three associations (*Fraxinus pennsylvanica* / *Leersia lenticularis* - *Carex lupulina* Forest, *Quercus michauxii* / *Carpinus caroliniana* - *Ilex opaca* / *Leucothoe racemosa* Forest, and *Quercus lyrata* - *Quercus laurifolia* / *Arundinaria gigantea* Forest) are coded on the vegetation map as the surrounding vegetation type.

Residual effects of severe disturbance further complicated both classification and mapping. The upland portions of the park were all cleared and converted to agriculture at some time in the past. Duration of cropping varied and degree of recovery toward a natural vegetation type is in part a function of the time since disturbance. One upland type is the Successional Pine - Mixed Hardwood Upland Forest, and occurrences of this type still exist in such a disturbed state that further classification of the type is not of value.

In addition, classification of one of the matrix communities of the lowland portion of the park proved difficult due to disturbance. We recognized two phases of the *Celtis laevigata* - *Liquidambar styraciflua* - *Quercus laurifolia* / *Carpinus caroliniana* / *Arundinaria gigantea* / *Carex lupulina* Forest: the sweetgum phase, typical of the drier end of the community's habitat and the green ash phase, typical of the wetter end of the habitat. The data analysis does not

support recognition of these phases at the association level. However, field observations and perusal of the plot data indicate different affinities for these two types. The alliance into which the association is placed, the *Fraxinus pennsylvanica* - *Ulmus americana* - *Celtis (occidentalis, laevigata)* Temporarily Flooded Forest Alliance, contains vegetation of levees and alluvial flats dominated by some combination of the nominal species. The green ash phase fits this concept well. The sweetgum phase, however, bears affinities to the *Quercus (michauxii, pagoda, shumardii)* - *Liquidambar styraciflua* Forest Alliance and likely clustered in the data analysis outputs with the green ash phase due to an increase in the importance of *Celtis laevigata* and a decrease in the importance of oaks as a result of disturbance. Hurricane Hugo in 1989 seriously damaged 49% of trees in bottomland hardwood communities (Putz and Sharitz 1991) and the forest is still recovering. We suspect that this damage resulted in a decrease in oaks in formerly oak-dominated sites and an increase in the relatively more rapidly-growing *Celtis laevigata*. Both of these factors caused difficulties in defining the matrix bottomland communities. Future work may lead to clarification of this matter.

The classification of Congaree Swamp National Monument follows. A field key, a list of plot assignments to types, and descriptions for each of the types are included in later sections of the report.

Conclusions

The vegetation of Congaree Swamp National Monument was classified using the techniques established for the USGS-NPS Vegetation Mapping Program. Many of the vegetation types fit within existing associations in the ICEC, but several new types were described. The classification resulted in twenty-two types being defined including twenty forests, one woodland, and one shrubland.

Of the newly defined types, the woodland (*Pinus palustris* – *Pinus taeda* / *Schizachyrium scoparium* Woodland) and one of the forests (*Liquidambar styraciflua* – *Quercus (nigra, phellos)* – *Pinus taeda* / *Vaccinium elliotii* – *Myrica cerifera* Forest) resulted from severe anthropogenic disturbance and have not been previously described because they are not of conservation interest although they are common in the Atlantic Coastal Plain. Seven of the forests have scattered occurrences in large river systems of at least the Mid- and South-Atlantic Coastal Plains, but have not been previously described likely due to lack of inventory. These forests are: *Celtis laevigata* – *Liquidambar styraciflua* – *Quercus laurifolia* / *Carpinus caroliniana* / *Arundinaria gigantea* / *Carex lupulina* Forest, *Platanus occidentalis* – *Celtis laevigata* – *Fraxinus pennsylvanica* / *Lindera benzoin* – *Ilex decidua* / *Carex retroflexa* Forest, *Populus deltoides* / *Acer negundo* / *Boehmeria cylindrica* Forest, *Liquidambar styraciflua* – *Quercus nigra* – *Quercus laurifolia* / *Arundinaria gigantea* / *Carex abscondita* Forest, *Salix nigra* – *Fraxinus pennsylvanica* Forest, *Quercus lyrata* – *Quercus laurifolia* / (*Arundinaria gigantea*) Forest, and *Taxodium distichum* – *Fraxinus pennsylvanica* – *Quercus laurifolia* / *Acer rubrum* / *Saururus cernuus* Forest. One of the forests, *Acer saccharinum* / *Leersia lenticularis* – *Commelina virginica* Forest, needs rank evaluation because it may be relatively uncommon since it occurs at the southeastern limit of the range of the dominant tree species (*Acer saccharinum*). Two of the newly described forests (*Liquidambar styraciflua* – *Quercus laurifolia* / *Magnolia virginiana* / *Carex folliculata* Forest and *Quercus michauxii* / *Carpinus caroliniana* – *Ilex opaca*

/ *Leucothoe racemosa* Forest) occur at floodplain edges on organic soils that form at the base of slopes that are kept constantly moist from seepage from adjacent uplands. These forests likely occur outside the Monument, but are rare throughout their range. Distribution of the *Fraxinus pennsylvanica* / *Leersia lenticularis* – *Carex lupulina* Forest needs assessment. It was sampled in only one plot on the park and likely is not a common floodplain community.

Communication between the ecologists and the photointerpreters/mappers is vital for a successful project. One step that can help this is to begin fieldwork with aerial photos with preliminary vegetation polygons delineated. This helps the ecologists direct their sampling and the process of polygon delineation often generates questions relating to vegetation classification which the field team can investigate during vegetation sampling instead of after the field season.

References cited

Putz, F. E. and R. R. Sharitz. 1991. Hurricane damage to old-growth forest in Congaree Swamp National Monument, South Carolina, U.S.A. *Can. J. For. Res.* 21: 1765-1770.

Weakley, A. S., K. D. Patterson, S. Landaal, M. Pyne, and others (compilers). 1998. International classification of ecological communities: Terrestrial vegetation of the Southeastern United States. Working Draft of March 1998. The Nature Conservancy, Southern Conservation Science, Community Ecology Group. Chapel Hill, North Carolina.

Contributors

The following individuals contributed to this report.

Sally Landaal

Alan Weakley

The Nature Conservancy
Southern Conservation Science
101 Conner Drive, Suite 302
Chapel Hill, NC 27514

Jim Drake

The Nature Conservancy
Midwestern Conservation Science
1313 Fifth St SE, Suite 314
Minneapolis, MN 55414

2. CLASSIFICATION OF THE CONGAREE SWAMP NATIONAL MONUMENT

I. FOREST. Trees with their crowns overlapping (generally forming 60-100% cover)

I.B. Deciduous forest. Deciduous tree species generally contribute >75% of the total tree cover

I.B.2. Cold-deciduous forest.

I.B.2.N. Natural/Semi-natural

I.B.2.N.a. Lowland or submontane cold-deciduous forest (e.g. broadleaf forests of the Midwest)

Fagus grandifolia - *Quercus alba* Forest Alliance

Fagus grandifolia - *Quercus nigra* Forest

Quercus nigra Forest Alliance

Liquidambar styraciflua - *Quercus* (*nigra*, *phellos*) - *Pinus taeda* / *Vaccinium elliotii* - *Myrica cerifera* Forest

I.B.2.N.d. Temporarily flooded cold-deciduous forest (e.g. alluvial bottomland hardwoods)

Acer saccharinum Temporarily Flooded Forest Alliance

Acer saccharinum / *Leersia lenticularis* - *Commelina virginica* Forest

Fraxinus pennsylvanica - *Ulmus americana* - *Celtis* (*occidentalis*, *laevigata*) Temporarily Flooded Forest Alliance

Celtis laevigata - *Fraxinus pennsylvanica* - *Acer negundo* - (*Juglans nigra*) / *Asimina triloba* / *Carex grayi* Forest

Celtis laevigata - *Liquidambar styraciflua* - *Quercus laurifolia* / *Carpinus caroliniana* / *Arundinaria gigantea* / *Carex lupulina* Forest

Platanus occidentalis - (*Fraxinus pennsylvanica*, *Celtis laevigata*, *Acer saccharinum*) Temporarily Flooded Forest Alliance

Platanus occidentalis - *Celtis laevigata* - *Fraxinus pennsylvanica* / *Lindera benzoin* - *Ilex decidua* / *Carex retroflexa* Forest

Populus deltoides Temporarily Flooded Forest Alliance

Populus deltoides / *Acer negundo* / *Boehmeria cylindrica* Forest

Quercus (*phellos*, *nigra*, *laurifolia*) Temporarily Flooded Forest Alliance

Liquidambar styraciflua - *Quercus nigra* - *Quercus laurifolia* / *Arundinaria gigantea* / *Carex abscondita* Forest

Salix nigra Temporarily Flooded Forest Alliance

Salix nigra - *Fraxinus pennsylvanica* Forest

I.B.2.N.e. Seasonally flooded cold-deciduous forest (e.g. deciduous larch forests in Alaska, peat forests)

Acer rubrum - *Fraxinus pennsylvanica* Seasonally Flooded Forest Alliance

Fraxinus pennsylvanica / *Leersia lenticularis* - *Carex lupulina* Forest

Planera aquatica Seasonally Flooded Forest Alliance

Planera aquatica Forest

Quercus lyrata - (*Carya aquatica*) Seasonally Flooded Forest Alliance

Quercus lyrata - *Quercus laurifolia* / *Arundinaria gigantea* Forest

Quercus phellos Seasonally Flooded Forest Alliance

Quercus phellos / *Carex (intumescens, jorii)* / *Sphagnum lescurii* Forest

Taxodium distichum - *Nyssa (aquatica, biflora, ogeche)* Seasonally Flooded Forest Alliance

Taxodium distichum - *Fraxinus pennsylvanica* - *Quercus laurifolia* / *Acer rubrum* / *Saururus cernuus* Forest

I.B.2.N.f. Semipermanently flooded cold-deciduous forest (e.g. cypress swamp)

Nyssa aquatica - (*Taxodium distichum*) Semipermanently Flooded Forest Alliance

Taxodium distichum - *Nyssa aquatica* / *Fraxinus caroliniana* Forest

Taxodium distichum - *Nyssa aquatica* - *Nyssa biflora* / *Fraxinus caroliniana* / *Itea virginica* Forest

I.B.2.N.g. Saturated cold-deciduous forest

Liquidambar styraciflua Saturated Forest Alliance

Liquidambar styraciflua - *Quercus laurifolia* / *Magnolia virginiana* / *Carex folliculata* Forest

Nyssa biflora - *Acer rubrum* - (*Liriodendron tulipifera*) Saturated Forest Alliance

Nyssa biflora - (*Acer rubrum*) / *Ilex opaca* / *Leucothoe axillaris* / *Carex atlantica* ssp. *capillacea* Forest

Quercus michauxii - *Quercus pagoda* Saturated Forest Alliance

Quercus michauxii / *Carpinus caroliniana* - *Ilex opaca* / *Leucothoe racemosa* Forest

I.C. Mixed evergreen-deciduous forest. Evergreen and deciduous species generally contribute 25-75% of total tree cover. (Includes semi-deciduous, semi-evergreen, mixed evergreen-deciduous xeromorphic, and mixed needle-leaved evergreen - cold-deciduous woody vegetation)

I.C.3. Mixed needle-leaved evergreen - cold-deciduous forest.

I.C.3.N. Natural/Semi-natural

I.C.3.N.a. Mixed needle-leaved evergreen - cold-deciduous forest

Successional Pine - Mixed Hardwood Upland Forest

II. WOODLAND. Open stands of trees with crowns not usually touching (generally forming 25-60% cover. Canopy tree cover (rarely) may be less than 25% in cases when the cover of each of the other lifeforms present (i.e. shrub, dwarf-shrub, herb, nonvascular) is less than 25% and tree cover exceeds the cover of the other lifeforms.

II.A. Evergreen woodland. Evergreen species generally contribute >75% of the total tree cover.

II.A.4. Temperate or subpolar needle-leaved evergreen woodland

II.A.4.N. Natural/Semi-natural

II.A.4.N.a. Rounded-crowned temperate or subpolar needle-leaved evergreen woodland (e.g. pine, Western juniper)

Pinus palustris - *Pinus (echinata, taeda)* Woodland Alliance

Pinus palustris - *Pinus taeda* / *Schizachyrium scoparium* Woodland

III. SHRUBLAND (SCRUB). Shrubs generally greater than 0.5 m tall with individuals or clumps not touching to overlapping (generally forming >25% canopy cover -- tree cover generally <25%). Shrub cover (rarely) may be less than 25% in cases when the cover of each of the other lifeforms present (i.e. tree, dwarf-shrub, herb, nonvascular) is less than 25% and shrub cover exceeds the cover of the other lifeforms.

III.B. Deciduous shrubland (scrub). Deciduous species generally contribute to >75% of the total shrub cover

III.B.2. Cold-deciduous shrubland

III.B.2.N. Natural/Semi-natural

III.B.2.N.e. Seasonally flooded cold-deciduous shrubland (e.g. blueberry-azalea thickets)

Vitis rotundifolia - *Ampelopsis arborea* - *Campsis radicans* Seasonally Flooded Vine-Shrubland Alliance

Vitis rotundifolia - *Ampelopsis arborea* - *Campsis radicans* Seasonally Flooded Vine-Shrubland

5. APPENDICES

Appendix A: Glossary of Terms for Vegetation Descriptions

GLOBAL NAME

Association name based on Latin names of dominant or characteristic plant species. The association (or plant association) is the finest level of the classification system. It is the level at which community inventory and conservation action are aimed.

COMMON NAME

Association common name; same as the GNAME, but with common names instead of scientific names for the species.

SYNONYM

A unique name by which the community may be more easily recognized or described.

PHYSIOGNOMIC CLASS

The second level of National Vegetation Classification System which is a vegetation structural classification adapted from UNESCO 1973 and Driscoll et al. 1984. This level is based on the structure of the vegetation. This is determined by the height and relative percentage of cover of the dominant life-forms: tree, shrub, dwarf-shrub, herbaceous and nonvascular.

PHYSIOGNOMIC SUBCLASS

The third level of National Vegetation Classification System. This level is determined by the predominant leaf phenology of classes defined by a tree, shrub or dwarf-shrub stratum, the persistence and growth form of herbaceous and nonvascular vegetation, and particle size of the substrate for sparse vegetation (e.g., consolidated rocks, gravel/cobble).

PHYSIOGNOMIC GROUP

The fourth level of National Vegetation Classification System. The group generally represents a grouping of vegetation units based on leaf characters, such as broad-leaf, needle-leaf, microphyllous, and xeromorphic. These units are identified and named with broadly defined macroclimatic types to provide a structural-geographic orientation, but the ecological climate terms do not define the groups *per se*.

PHYSIOGNOMIC SUBGROUP

The fifth level of National Vegetation Classification System represents a distinction between natural vegetation, including natural, semi-natural and some modified vegetation, and cultural vegetation (planted/cultivated).

FORMATION

The sixth level of National Vegetation Classification System; represents a grouping of community types that share a definite physiognomy or structure and broadly defined environmental factors, such as elevation and hydrologic regime.

ALLIANCE: Level of National Vegetation Classification System reflecting a physiognomically uniform group of plant associations sharing one or more diagnostic species (dominant, differential, indicator, or character), which (generally) are found in the uppermost stratum of the vegetation.

CLASSIFICATION CONFIDENCE LEVEL: the degree of confidence associated with the classification of the Element. This confidence is based on the quality and type of data used in the analysis as well as the extent to which the entire (or potential) range of the Element was considered

1 = STRONG

Classification based on recent field data. Information is based on Element Occurrences or other data based on occurrences that can be relocated. Classification considers information collected across the entire range or potential range of the Element. Classification may be based on quantitative or qualitative data

USGS-NPS Vegetation Mapping Program
Congaree Swamp National Monument

2 MODERATE

Classification is based on data that is of questionable quality, limited numbers of sample points, or data from a limited range.

3 WEAK

Classification is based on secondary or anecdotal information. Or a new type for which data have only been collected at a very small number of sites.

USFWS WETLAND SYSTEM:

USFWS Wetland Classification System, if applicable. (Cowardin, L.M., V. Carter, F.C. Golet, E.T. LaRoe. 1979. *Classification of Wetlands and Deepwater Habitats of the United States*. United States Fish and Wildlife Service. Washington, DC.).

RANGE:

Globally

Description of the association's present range, including states of occurrence

XXXXX National Park

Description of where the community is found in the Park or environs.

ENVIRONMENTAL DESCRIPTION

Globally

Most important environmental determinants of the biological composition or structure of this association and/or its subtypes.

XXXXX National Park

Important environmental determinants of the biological composition or structure of this association within the Park or environs (if known).

MOST ABUNDANT SPECIES

Globally

Stratum

Species

Most abundant species by stratum

XXXXX National Park

Stratum

Species

Most abundant species by stratum, based on data and observations in the Park and environs.

DIAGNOSTIC SPECIES

Globally

Latin names of plant species not necessarily most abundant, but which are characteristic or diagnostic of the association when taken singly or in combination with other species.

XXXXX National Park

Characteristic species for the association in the Park and environs.

VEGETATION DESCRIPTION

Globally

Additional comments on vegetation attributes of the association including species richness, diversity, physiognomic structure, spatial distribution of vegetation, strata height, dominant life-forms, coverage of unvegetated substrate, and additional compositional comments.

XXXXX National Park

Vegetation description for the association as it is found in the Park and environs.

OTHER NOTEWORTHY SPECIES

High ranked species, animals, endemics, disjuncts, exotics that are found within occurrences of this association.

CONSERVATION RANK

USGS-NPS Vegetation Mapping Program
Congaree Swamp National Monument

Global Element rank which characterizes the relative rarity or endangerment of the association world-wide.

RANK JUSTIFICATION

Reason for assigning the Global Element Rank, such as number of occurrences, number of hectares, total area reduction from original, threats, degradation, etc.

DATABASECODE

Element Code from the National Community Database.

COMMENTS

Globally

Any other comments about this association not covered in the fields above such as landscape relationships, inclusion communities, etc.

XXXXX National Park

Any other comments about this association specific to the Park, including notes about possible problems in photointerpretation.

REFERENCES

Sources of information used to define or describe the association

Appendix B: Example Field Data Sheets for Congaree Swamp National Monument

Zone 1

Page 1 of 5

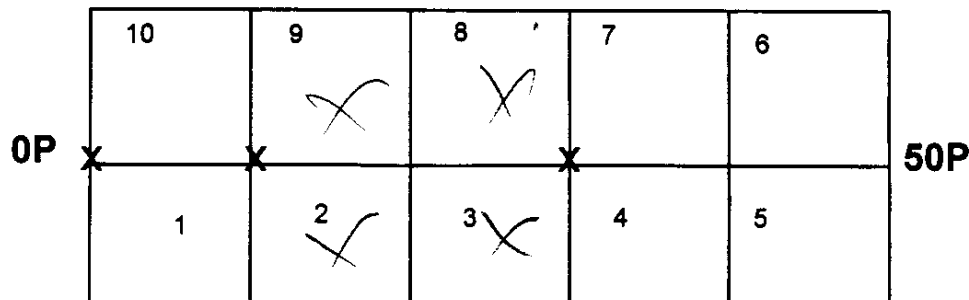
Congaree Swamp National Monument Vegetation Inventory and Mapping Program

Field Forms

IDENTIFIERS/LOCATORS

Polygon Code	F		Plot Code	X-024	
Provisional Community Name	SWAMP TUPELO				
Quad Name			Quad Code		
Latitude			N Longitude		
Survey Date	8/10/96	Surveyors	Gazoy / Hu	GPS File #	R081020A
				LP =	236
Directions to Plot	4M N OF O.P.				
WALK CA. 4500' FROM END OF GARRICK RD TO OLD TUPAL. TAKE A 197° BEARING INTO SWAMP TUPELO BOG TO O.P.					
Plot Length	50	Plot Width	20	Compass Direction from OP	60°
Film Roll #	3	Frame(s)	20-21	Location(s)	OP
				Bearing(s)	60°
				Focal Length(s)	50mm
Plot Representativeness/Why Chosen					

Plot Map: Fill in the template below, showing arrangement of intensely sampled quadrats for shrubs and herbs (typically 2, 3, 8, 9). Place permanent marker at OP and indicate locations of other markers (typically at Xs).



ENVIRONMENTAL DESCRIPTION

2-004

Elevation _____	Slope _____	Aspect _____
Topographic Position _____ summit, ridgetop _____ middle slope _____ flatlands _____ lower convex slope _____ upper convex slope <input checked="" type="checkbox"/> bottom, terrace		
Landform _____ open water _____ alluvial flat _____ mesic slope <input checked="" type="checkbox"/> slough _____ levee _____ true upland <input checked="" type="checkbox"/> backswamp _____ ridge <input checked="" type="checkbox"/> seepage area _____ terrace		
Surficial Geology _____ alluvial deposits <input checked="" type="checkbox"/> organic deposits _____ coastal plain sediments _____ (other-describe)		
Hydrologic Regime (non-tidal) _____ permanently flooded <input checked="" type="checkbox"/> saturated _____ seasonally/temporarily saturated _____ semipermanently flooded _____ seasonally/temporarily flooded _____ intermittently flooded		
Salinity <input checked="" type="checkbox"/> freshwater		
Soil Taxon/Description DOROVAN MUCK		
Soil Texture _____ sand _____ clay loam _____ sandy loam _____ clay _____ loam <input checked="" type="checkbox"/> peat _____ silt loam <input checked="" type="checkbox"/> muck		
Soil Drainage _____ rapidly drained <input checked="" type="checkbox"/> somewhat poorly drained <input checked="" type="checkbox"/> very poorly drained _____ well drained _____ poorly drained _____ moderately well drained		

Miscellaneous Threatened and endangered species, exotic species		✓
Natural and Anthropogenic Disturbance		1 ST. DEAD
Animal Use Evidence		HOGS

VEGETATION DESCRIPTION

2-024

Leaf Type			
<input checked="" type="checkbox"/> Broad-leaved	<input type="checkbox"/> Needle-leaved	<input type="checkbox"/> Microphyllous	
<input type="checkbox"/> Graminoid	<input type="checkbox"/> Forb	<input type="checkbox"/> Pteridophyte	
Leaf Phenology (of uppermost stratum having >10% cover)			
<u>Trees and Shrubs</u>			
<input type="checkbox"/> Evergreen	<input checked="" type="checkbox"/> Deciduous (cold-deciduous)	<input type="checkbox"/> Mixed evergreen cold-deciduous	
<u>Herbs</u>			
<input type="checkbox"/> Annual	<input checked="" type="checkbox"/> Perennial		
Cowardin System			
<input type="checkbox"/> Upland	<input checked="" type="checkbox"/> Palustrine	<input type="checkbox"/> Estuarine	<input type="checkbox"/> Lacustrine <input type="checkbox"/> Riverine
Physiognomic Class			
<input checked="" type="checkbox"/> Forest	<input type="checkbox"/> Woodland	<input type="checkbox"/> Sparse Woodland	<input type="checkbox"/> Shrubland <input type="checkbox"/> Sparse shrubland
<input type="checkbox"/> Dwarf Shrubland	<input type="checkbox"/> Sparse Dwarf Shrubland	<input type="checkbox"/> Herbaceous	<input type="checkbox"/> Sparse Vascular Veg.

Cover classes: 1 (<10%), 2 (10-25%), 3 (25-80%), 4 (80-100%)

Strata	Height	Cover	Major Species (or Diagnostic)
T1 Emergent			
T2 Canopy	30M	4	NYSSA BIFLORA
T3 Sub-canopy	5-30M	3	MIXED
S1 Tall shrub	0.5-5M	4	MIXED
S2 Short shrub	<0.5M	2	LEUCOTHOE AXILLARIS LYONIA LUCIDA
H Herbaceous	<0.5M	2-3	MIXED
V Vine/liana	to 20M?	2	TOXICODENDRON R. DECUMARA 3
N Non-vascular	<0.5M	1-2	SPHAGNUM SP.
E Epiphyte			

USGS-NPS Vegetation Mapping Program Congaree Swamp National Monument

Congaree Swamp National Monument Herbs Shrubs & Vines Page 4 of 5

Team: 2 Plot: 024 Size: 50x20 Date: 8/10/96
Strata: Emergent >5m, Canopy >5m, Subcanopy >5m, Tall Shrub 0.5-5m, Short Shrub <.5m, Herbaceous, Vine,
Epiphyte, Non-vascular
Cover Classes: 1: <10, 2: 1-10%, 3: 10-25%, 4: 25-50%, 5: 50-75%, 6: 75-95%, 7: >95%

Species	C	Sp. Code	Subplot	✓	Herbaceous Cover	✓	Short Cover	✓	Tall Cover	✓	Vine Ground	Vine Aerial	dbh > 2.5
SPHAGNUM SP.				✓	✓	4							
WOODAREO				✓	✓	2							
OSMUCIANA				✓	✓	3							
OSMUREGA				✓	✓	2							
SAURCERN				✓	✓	3							
VIOLPRIM				✓	✓	1							
POLYSETA				✓	✓	1							
HYPERVIRG				✓	✓	2							
LABECLAV				✓	✓	1							
TUDWPALM				✓	✓	3							
CAREBROM				✓	✓	2							
CARELEPT				✓	✓	1							
LYONLUCT							✓	2	✓	2			
LEUCAXILL							✓	3	✓	5			
RUBUS SP.							✓	1					
LYONRACE									✓	2			
VACC CORY									✓	1			
MYRICERT							✓	1	✓	2			
VIBURNUM							✓	1	✓	1			
MAGNVIRG							✓	1	✓	1			
ACERRUBR							✓	1					
TOXIRADI											✓	1	2
SMILLAIR											✓	1	2
DECUBARB											✓	1	
SMILHISP											✓	1	
MIKASCAN											✓	1	
LIANSWORT				✓	✓	2							

USGS-NPS Vegetation Mapping Program
Congaree Swamp National Monument

Team members 2, Plot 024 Size 20x50, Date 8/10/96 page 5 of 5
1: <10%, 2: 10-25%, 3: 25-60%, 4: 60%+

COVER CLASS														
Species	C	Spp Code	Sub-plot	Emergent	Canopy	Sub-canopy	<10cm	10-15cm	15-20cm	20-25cm	25-30cm	30-35cm	35-40cm	>40cm
NYSSBIL					4					:	:	H	S	60.60 50.75
ALERRUBR						2	☐			:	.	.		
LIQUSTYR						2	☐	:		.				
ILEX OPAC						2	☐							
PERS PALM						2	☐:	.						
QUER LAUR						1	'							
MAGN VIRG						1	:							
LIRITUL						2	☐	::						
LYON RACE														
VACCORY						1	:							
ALNUSERR						1	::							
MYRICERI						1	:							
QUERPHEL						1	'							

NYSS BIFL: 45, 65, 55, 45, 55

Appendix C: Plot Assignment to Vegetation Types Referenced by Database Code

CEGL007211	<i>Fagus grandifolia</i> - <i>Quercus nigra</i> Forest Plots 1-45; 1-51; 2-17; 2-23; 2-37; 2-55; 2-56
CEGL007726	<i>Liquidambar styraciflua</i> - <i>Quercus (nigra, phellos)</i> - <i>Pinus taeda</i> / <i>Vaccinium elliotii</i> - <i>Myrica cerifera</i> Forest Plots 1-64; 2-43; 2-53; 2-60
CEGL007727	<i>Acer saccharinum</i> / <i>Leersia lenticularis</i> - <i>Commelina virginica</i> Forest Plot 1-54
CEGL004740	<i>Celtis laevigata</i> - <i>Fraxinus pennsylvanica</i> - <i>Acer negundo</i> - (<i>Juglans nigra</i>) / <i>Asimina triloba</i> / <i>Carex grayi</i> Forest Plots 1-29; 1-39; 1-57
CEGL007728	<i>Fraxinus pennsylvanica</i> / <i>Leersia lenticularis</i> - <i>Carex lupulina</i> Forest Plot 2-38
CEGL007736	<i>Celtis laevigata</i> - <i>Liquidambar styraciflua</i> - <i>Quercus laurifolia</i> / <i>Carpinus caroliniana</i> / <i>Arundinaria gigantea</i> / <i>Carex lupulina</i> Forest Plots 1-03; 1-04; 1-05; 1-07; 1-08; 1-10; 1-11; 1-13; 1-14; 1-15; 1-17; 1-18; 1-19; 1-20; 1-26; 1-28; 1-29; 1-31; 1-32; 1-33; 1-35; 1-37; 1-38; 1-56; 1-58; 1-60; 2-02; 2-04; 2-05; 2-10; 2-11; 2-12; 2-20; 2-21; 2-25; 2-26; 2-27; 2-29; 2-34; 2-35; 2-39; 2-42; 2-46; 2-47; 2-48
CEGL007730	<i>Platanus occidentalis</i> - <i>Celtis laevigata</i> - <i>Fraxinus pennsylvanica</i> / <i>Lindera benzoin</i> - <i>Ilex decidua</i> / <i>Carex retroflexa</i> Forest Plots 1-22; 1-23; 1-50; 1-52; 1-55
CEGL007731	<i>Populus deltoides</i> / <i>Acer negundo</i> / <i>Boehmeria cylindrica</i> Forest Plots 1-61; 1-62
CEGL007732	<i>Liquidambar styraciflua</i> - <i>Quercus nigra</i> - <i>Quercus laurifolia</i> / <i>Arundinaria gigantea</i> / <i>Carex abscondita</i> Forest Plots 1-02; 1-34; 1-40; 1-41; 1-42; 1-44; 2-07; 2-08; 2-13; 2-18; 2-32; 2-33; 2-36; 2-49
CEGL007734	<i>Salix nigra</i> - <i>Fraxinus pennsylvanica</i> Forest Plot 1-12
CEGL007394	<i>Planera aquatica</i> Forest Plots 1-49; 1-53
CEGL007801	<i>Quercus lyrata</i> - <i>Quercus laurifolia</i> / (<i>Arundinaria gigantea</i>) Forest Plots 2-30; 2-31; 2-58
CEGL007403	<i>Quercus phellos</i> / <i>Carex (intumescens, joorii)</i> - <i>Chasmanthium sessiliflorum</i> / <i>Sphagnum lescurii</i> Forest Plots 2-57; 2-59; 2-61

USGS-NPS Vegetation Mapping Program
Congaree Swamp National Monument

CEGL007719	<i>Taxodium distichum</i> - <i>Fraxinus pennsylvanica</i> - <i>Quercus laurifolia</i> / <i>Acer rubrum</i> / <i>Saururus cernuus</i> Forest Plots 1-01; 1-16; 1-24; 1-25; 1-47
CEGL007432	<i>Taxodium distichum</i> - <i>Nyssa aquatica</i> - <i>Nyssa biflora</i> / <i>Fraxinus caroliniana</i> / <i>Itea virginica</i> Forest Plots 2-01; 2-14; 2-19; 2-41
CEGL007431	<i>Taxodium distichum</i> - <i>Nyssa aquatica</i> / <i>Fraxinus caroliniana</i> Forest Plots 1-06; 1-09; 1-27; 1-30; 1-46; 1-59; 2-06; 2-09; 2-28; 2-40; 2-50; 2-51
CEGL004631	<i>Liquidambar styraciflua</i> - <i>Quercus laurifolia</i> / <i>Magnolia virginiana</i> / <i>Carex folliculata</i> Forest Plot 2-15
CEGL004427	<i>Nyssa biflora</i> - (<i>Acer rubrum</i>) / <i>Ilex opaca</i> / <i>Leucothoe axillaris</i> / <i>Carex atlantica</i> ssp. <i>capillacea</i> Forest Plots 1-36; 2-03; 2-24; 2-44; 2-45; 2-54
CEGL007737	<i>Quercus michauxii</i> / <i>Carpinus caroliniana</i> - <i>Ilex opaca</i> / <i>Leucothoe racemosa</i> Forest Plot 1-63
CEGL007738	<i>Pinus palustris</i> - <i>Pinus taeda</i> / <i>Schizachyrium scoparium</i> Woodland Plots 2-22; 2-62
CEGL004620	<i>Vitis rotundifolia</i> - <i>Ampelopsis arborea</i> - <i>Campsis radicans</i> Vine-Shrubland Plot 1-21

Upland pine - mixed hardwood type
Plots 1-44; 2-52

* Plots 1-43 and 2-16 were not classified because plots were placed in wetland/upland transition zones and, therefore, do not represent community units.